

# 20ES004 - Advanced Embedded Computing System

## UNIT-I

**FUNDAMENTALS OF OPERATING SYSTEMS:** Over view of operating systems, Process and threads, Processes and Programs, Programmer view of processes, OS View of processes, Threads, Scheduling, Non preemptive and preemptive scheduling, Real Time Scheduling, Process Synchronization, Semaphores, Message Passing, Mailboxes, Deadlocks, Synchronization and scheduling in multi-processor Operating Systems

## UNIT – II

**LINUX FUNDAMENTALS:** Introduction to Linux, Basic Linux commands and concepts, Logging in, Shells, Basic text editing, advanced shells and shell scripting, Linux File System, Linux programming, Processes and threads in Linux, Inter process communication, Devices, Linux System calls.

## UNIT – III

**INTRODUCTION TO EMBEDDED LINUX:** Embedded Linux- Introduction, Advantage, Embedded Linux Distributions, Architecture, Linux kernel architecture, Userspace, Linux startup sequence, GNU cross platform Toolchain.

## UNIT – IV

**BOARD SUPPORT PACKAGE AND EMBEDDED STORAGE:** Inclusion of BSP in kernel build procedure, Boot loader Interface, Memory Map, Interrupt Management, PCI Subsystem, Timers, UART, Power Management, Embedded Storage, Flash Map, Memory Technology Device (MTD) – MTD Architecture, MTD Driver for NOR Flash, The Flash Mapping drivers, MTD Block and character devices, mtdutil package, Embedded File Systems, Optimizing storage space – Turning kernel memory.

## UNIT – V

**EMBEDDED DRIVERS AND APPLICATION PORTING :** Linux serial driver, Ethernet driver, I2C subsystem, USB gadgets, Watchdog timer, Kernel Modules, Application porting roadmap, Programming with threads, Operating System Porting Layer, Kernel API Driver, Case studies RTLinux – uClinux.

## TEXTBOOKS:

1. Mastering Embedded Linux Programming (2nd Edition), Chris Simmonds (ISBN 9781787283282)
2. Linux System Programming (2nd Edition), Robert Love (ISBN 978-1449339531)
3. Linux Device Drivers (Latest Edition) - Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman

## REFERENCE BOOKS:

1. Dhananjay M. Dhamdhare, 'Operating Systems A concept based Approach', Tata Mcgraw-Hill Publishing Company Ltd.
2. Matthias Kalle Dalheimer, Matt Welsh, 'Running Linux', O'Reilly Publications 2005.

3. Mark Mitchell, Jeffrey Oldham and Alex Samuel 'Advanced Linux Programming' New Riders Publications.
4. Karim Yaghmour, 'Building Embedded Linux Systems', O'Reilly Publications 2003.
5. Abott, Linux for Embedded and real time applications, newness, 3rd edition.
6. P. Raghavan, Amol Lad, Sriram Neelakandan, 'Embedded Linux System Design and Development', Auerbach Publications 2006